

Research Article

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Study of changes in soil chemical properties of Asma village of Valsad district

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Summary

A study was carried out to examine the changes in soil chemical properties and crop yields in a area of Asma village of Valsad district (Gujarat). The result showed that the mean values of soil pH and EC were increased with time. Although, average values of organic carbon, available P and available K were decreased year by year. Also difference between maximum and minimum values of soil pH, EC, organic carbon, available P and available K become larger with time due to greatly different in fertilizer application between farmers. Though the yields of crops were increased with cultivation of hybrid varieties but the changes in soil nutrient status have shown there might be need to improve soil management with application of organic and biofertilisers to sustain the fertility of the soil.

Key words : Chemical fertilizers, Soil, Nutrients, Soil health

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Introduction

Crops remove nutrients from the soil through the agricultural produce (food, fibre, wood) and crop residues. This may result in declining soil fertility if replenishment with inorganic fertilizers or manure is inadequate. A decline in soil fertility implies a decline in the levels of soil organic C, pH, EC, and plant nutrients. Soil fertility decline includes nutrient depletion (larger removal than addition of nutrients), nutrient mining (large removal of nutrients and no inputs), acidification (decline in pH and/or an increase in exchangeable Al), the loss of organic matter, and an increase in toxic elements such as aluminum (Hartemink, 2003). High and sustained crop yield has been reported with judicious and balanced NPK fertilization combined with organic matter amendment (Ayoola and Olukemi, 2006).

Asma village of Pardi block of Valsad district is located near the Gujarat Vidyapeeth, Krishi Vigyan Kendra, Ambheti. Main crops of Valsad district are paddy, sugarcane, mango, sapota, banana, cashewnut, vegetables (brinjal, chilli, okra, cucurbits) and pulses (pigeonpea, blackgram, gram etc.). Soils of Asma and its nearby areas, in general can be classified as medium black to heavy black soil with low fertility.

Srivastava and Pandey (1999) believed that most farmers continuously use a great deal of chemical fertilizers for increasing production without awareness of their farm fertility condition, results in increasing cost and adverse effect on soil health.

Due to the canal irrigation and cultivation of hybrid varieties of crops, it is observed that farmers of nearby area of Asma village are using large amount of chemical

fertilizers with a view to produce more from the poorly fertile soil. Only chemical fertilizers, mostly the urea and DAP at present, are applied. Poor growth and yield of crops such as paddy, sugarcane, chilly, brinjal etc. with micronutrient deficiency symptoms appeared recently in some areas. This was considered to be due to soil degradation, a consequence of injudicious use of chemical fertilizers.

Maintenance of the fertility status of the soil is also an important factor in order to obtain a stable and sustainable agro ecosystem. This study, therefore, aimed to examine changes in soil chemical properties of Asma village of Valsad district (Gujarat).

Resource and Research Methods

To conduct soil survey, KVK-Valsad was collected 50 soil samples from selected farmers of Asma village of Pardi block of Valsad (Gujarat) during Oct.-Nov. 2013 and 2015 prior to sown crop in field. Each sample were placed in 4 x 6 inches polythene bags. The soil samples were collected from 0-15cm depth by using the soil sampler at harvest of crop. The samples were powdered using a wooden mortar and pestle and passed through 2 mm plastic sieve to avoid metallic contamination. These samples were analyzed to determine chemical properties.

Chemical analysis :

Electrical conductivity and pH of soil measured with a soil-to-water ratio of 1:2.5 at 25°C by conductometric method and potentiometric method (Jackson, 1973), respectively. Soil organic carbon was measured with Walkley and Black titration method (Jackson, 1973). Extraction 0.5 M NaHCO₃ pH (8.5). Colorimetric method (Olsens *et al.*, 1954) was used to test the soil available P

and soil available K was determined with extraction: 1 N H₄OAC pH (7.0) flame photometric method (Jackson, 1973).

Data analysis :

After calculating soil analysis data, maximum, minimum, mean and standard deviation are calculated for soil parameters. Excel is used to perform all statistical analysis

Research Findings and Discussion

Result of study showed that the chemical properties of EC and pH of soils were increased with time (Joshi *et al.*, 2009). In 2013, data showed that the mean values of EC and pH of soils were 0.38 and 6.82, which were 0.50 and 7.26, simultaneously recorded during 2015. Mean values of organic carbon (%), available phosphorus (kg ha⁻¹) and available potash (kg ha⁻¹) were 0.40, 44.88 and 351.20, simultaneously recorded during 2013 which were noted 0.38, 41.96 and 345.60 simultaneously, during 2015. It was noted that the mean values of organic carbon, available phosphorus and available potash were decreased. However, the variation between maximum and minimum values of EC, pH, soil available N, P and K were increased due to due to greatly different in fertilizer application and soil management practices among farmers of Asma village (Chunmiao *et al.*, 2010 and Patel *et al.*, 2014).

Conclusion :

The agriculture will not be sustainable unless soil health is managed scientifically to meet present and future needs. Restoring the soil quality for crop production through the appropriate soil management techniques is

Table 1 : Variation of different soil properties between 2013 and 2015 (ANOVA analysis)						
Soil properties	Year	Mean	Std. Devi.	Maxi.	Mini.	F test
EC (dSm ⁻¹)	2013	0.38	0.16	0.69	0.11	2.803
	2015	0.50	0.48	3.10	0.08	
pH (1:2.5 at 25°C)	2013	6.82	0.64	8.42	6.12	7.809
	2015	7.26	0.90	8.70	5.20	
Organic carbon (%)	2013	0.40	0.12	0.69	0.21	0.321
	2015	0.38	0.20	1.20	0.08	
Available phosphorus (kg ha ⁻¹)	2013	44.88	16.01	82.00	7.00	0.958
	2015	41.96	13.74	68.00	15.00	
Available potash (kg ha ⁻¹)	2013	351.20	47.69	465.00	239.00	0.197
	2015	345.60	75.45	521.00	147.00	

important for all nations, primarily those at risk with respect to food security. Field survey study showed that the total dissolved salts *i.e.* salinity of soils of Asma village was increased with time. There were greatly different in fertilizer application between farmers and there exists a serious worsening of soil properties such as alkalinity and salinity induced by the long-term use of chemical fertilizers. Optimization of fertilization is urgently needed. Great efforts should be made to improve soil conditions for the sustained crop production.

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